Maher
DRILLING & PUMP SERVICES
Water Supply • Environmental • Construction

January 12, 1999

Barry Cohen
Ciba Specialty Chemicals
P.O. Box 71
Toms River, NJ 06754

Re: Job # 98-331-ES
Well Rehabilitation #110, #120
Cranston, RI

Dear Barry,

I have produced a summary of the field notes and calculations of the well redevelopment project. Also included is the before and after video survey of each well along with printouts of photographs taken during the injection process. If you have any further questions or need additional information please give me a call.

Pretreatment

Well #110	
Depth	36.8 ft
Screen Length	16.8 ft
Static Water Level	8.25 ft
Pumping Rate	49 gpm
Pumping Level	18.6 ft
Drawdown	10.35 ft
Specific Capacity	4.7 gpm/ft

Well #120	
Depth	37.7 ft
Screen Length	2 sections: 5 ft from 12'-17', bottom could not be determined
Static Water Level	7.2 ft
Pumping Rate	2 gpm
Pumping Level	18.2 ft
Drawdown	11 ft
Specific Capacity	0.18 gpm/ft

Redevelopment

Using the Aqua Freed process we injected 1500 lbs. of gaseous and liquid carbon dioxide for a period of one hour in each well.
At the thirty minute mark in well #110, bubbles of carbon dioxide were detected in the river (see photographs). At forty minutes, water was forced out of nearby well # 32S. Carbon dioxide gas was emanating from the ground surface around well #120 during the injection process, no other effects were evident.

Post Redevelopment

Well #110

4 hours pumping and surging, final output:

Pumping Rate	50 gpm
Pumping Level	14.5 ft
Drawdown	6.25 ft
Specific Capacity	8.0 gpm/ft

Well #120

3.5 hours pumping and surging, final output:

Pumping Rate	7.0 gpm
Pumping Level	below surge block, 8.7 ft from top of well
Drawdown	unknown
Specific Capacity	unable to calculate

Recommendations

To ensure the maximum efficiency of the wells we make the following recommendations:

1. Check and clean, if necessary, the water lines from well head to treatment facility. The lower pumping rate may be caused by increased head losses resulting from encrustation in the water lines. Some buildup was observed in the connection to the well head.
2. Monitor the specific capacity of each well by logging the pumping rate and drawdown of the well. When the capacity decreases by 30% redevelopment of the well may be necessary.

Thank you for choosing the D.L. Maher Co., if we can provide any other assistance or services in the future please call.

Sincerely,

D. L. MAHER CO.

Brian P. Maher

Brian P. Maher

D.L. Maher Co./Maher Environmental Development Log

Project Name: CIBA-GIEGY CRANSTON RI DLM Job #: 98-331-ES Dates: 12-8-98

Well #: 120 Diameter: 6" Depth: 37.7' BEFORE 42 AFTER Static Water Level: 7.2' ft

Pump being Used: PROSSER Surge Blocks set: 2, 4, 6, 8, 27, 29 ft from bottom of pump

INITIAL RATE 12-2-98 2 GPM 18.2' P/L

Chemicals used: ~~Bleach~~ AQUA FREED _____ gal Acid _____ gal Lime _____ pounds

Developer W. KISSINGER Helper T. COYLE

Date	Time	Pump Depth	Flow Rate	Pumping Level	Water Clarity	Comments	Eevac Air Prs
	1015	37	*	BELOW TOP	DK BRN BLACK HVY FINE SAND ON BOTTOM	INITIAL PUMPING 4½' OF FINE SAND IN WELL PUMPED TO CLEAN OFF BOTTOM	
	1215	42	5	SURGE	BLACK W/FINE SAND	BLACK TO CLOUDY GREY WHILE PUMPING & SURGING	
	1345	42	7	BLOCKS	BLACK COLOR WITH LESS FINES	PUMPED TO CLEAR BEFORE SHUTTING DOWN DEVELOPMENT OPERATION	

D.L. Maher Co./Maher Environmental Development Log

Project Name: CIBA-GIEGY CRANSTON RI DLM Job #: _____ Dates: 12-7-98

Well #: 110 Diameter: 6" Depth: 36.8' Static Water Level: 8.25' ft

Pump being Used: PROSSER PUMP Surge Blocks set: 2, 4, 6, 8, 10, 12 ft from bottom of pump

INITIAL RATE 12-2-98

Chemicals used: ~~Bleach~~ AQUA FREED _____ gal Acid _____ gal Lime _____ pounds 49 GPM 18.6' P/L

Developer W. KISSINGER Helper T. COYLE

Date	Time	Pump Depth	Flow Rate	Pumping Level	Water Clarity	Comments	Eevac Air Prs
12-7-98	1215	37'	30	12'	DK BRN BLK	ALMOST MUD - HAD TO RAISE PUMP SLOWLY UP & DOWN UNTIL BOTTOM CLR	
	1415	37'	50	14.5'	~~BROWN~~/BLACK WITH FINE SAND	BLACK COLOR WOULD CLEAR TO CLOUDY GREY AFTER PUMPING & SURGING - BLACK COLOR HEAVY AFTER DRY SURGING	
	1615	37'	50	14.5'	BLACK W/ FINE SAND TO CLEAR WITH STR	AIGHT PUMPING	
						PUMPED UNTIL CLEAR	
						BEFORE SHUTTING DOWN	
						DEVELOPMENT	

D.L. MAHER CO. - Aqua Freed Process Log

Job Name: Ciba Specialty Chemicals Job No.: 98-331-ES Date: 12/4/98

Well No. & Location: # 120

Well Construction: 6" Depth: 35.5' Screen Dia: 6" Length: Type: SS

Static Water Level: Packer Set At (Bottom Plate): Quantity of CO2: 1500/65

Comments: Dual Screen

Time	Injection Pressure	Head Pressure	Down Hole Pressure	Injection Duration	Liquid or Gas	Comments
12:15	25	15				
05	50	15				
10	75	20				
15	100	25				
20	75	30				
30	175	50	L	30s		
40	175	50	L	30s		
41	125	25	G			
50						Vary gas & Liquid pressure
60						All stop

D.L. MAHER CO. - Aqua Freed Process Log

Job Name: Ciba Specialty Chemicals Job No.: 98-331-ES Date: 12/4/98

Well No. & Location: #110

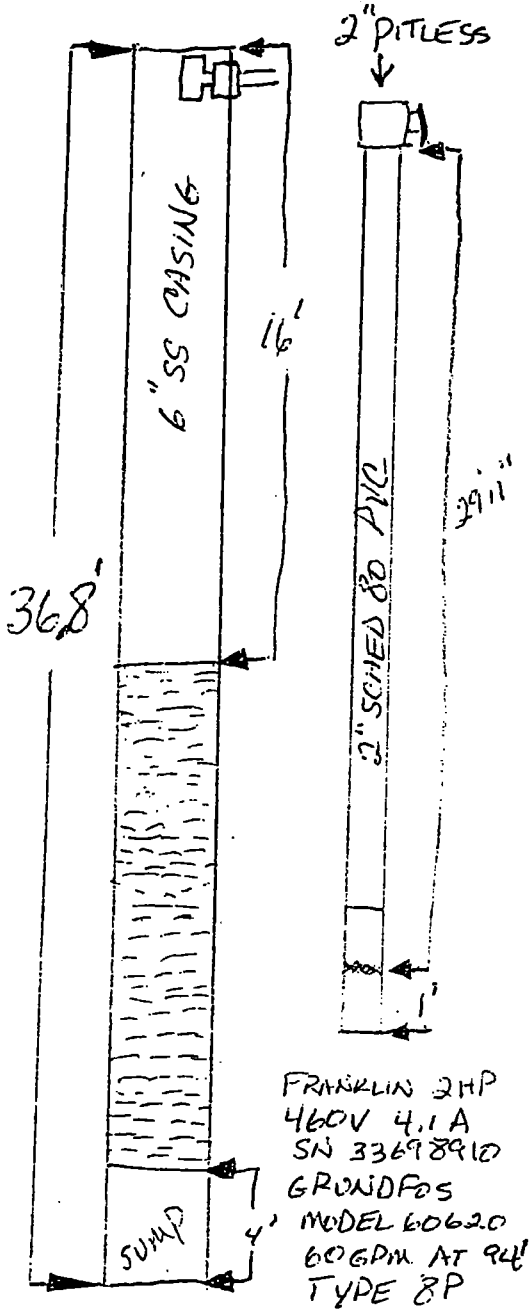
Well Construction: 6" Depth: 36.8' Screen Dia: 6" Length: ~~35~~ Type: SS

Static Water Level: _____ Packer Set At (Bottom Plate): _____ Quantity of CO2: 1500 lbs

Comments: _____

Time	Injection Pressure	Head Pressure	Down Hole Pressure	Injection Duration	Liquid or Gas	Comments
10:15	25	10				
05	50	15				
10	75	20				
15	100	25				
20	125	30				
25	125	30				
30	175	55	30s	L		bubbles in River, slight sheen
32	100	25				
40	175	50	30s	L		
42	100	25				Water from well 325
50	175	75	15 sec	4 shots	L	
60	175	75	15 sec	4 shots	L	
62	75					Shut down

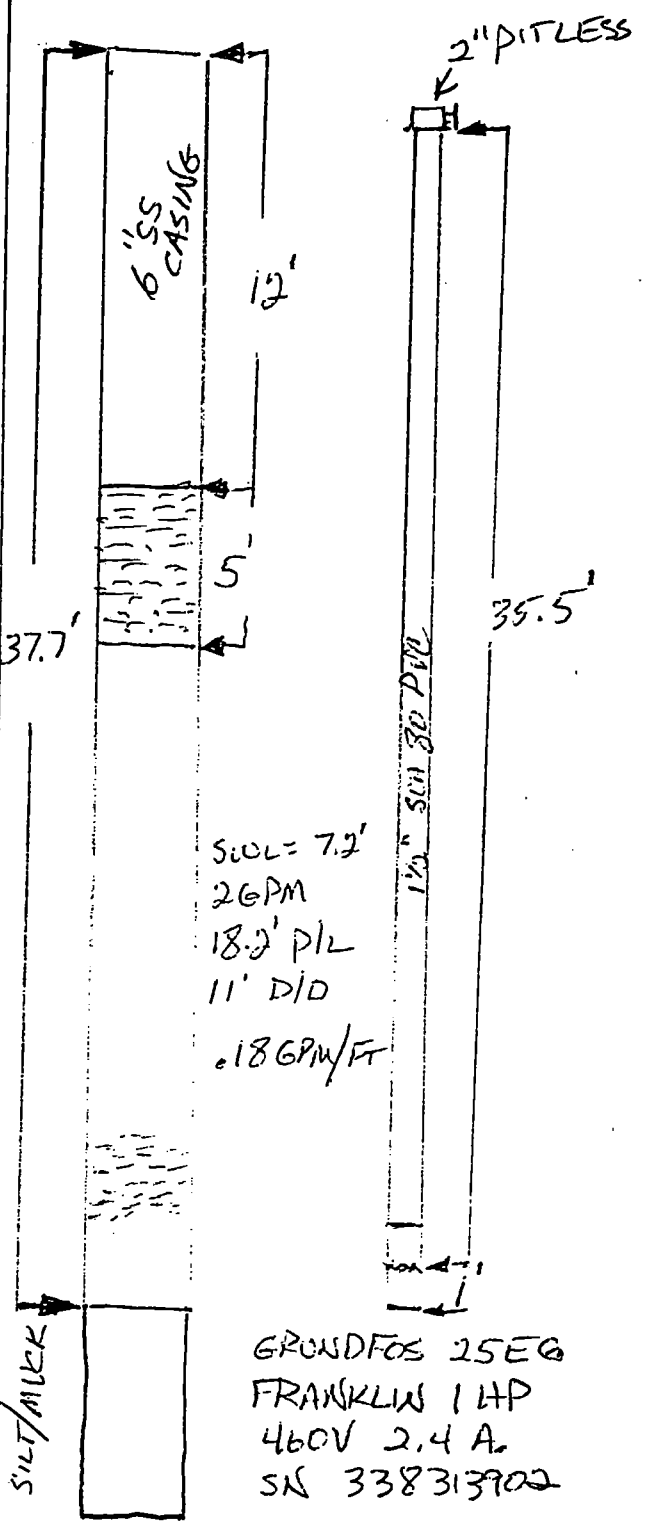
WELL #110-



FRANKLIN 2HP
460V 4.1 A
SN 3369891D
GRUNDFOS MODEL 60620
60 GPM AT 94'
TYPE 8P

SWL = 8.25'
49 GPM P/L 18.6' D/D 10.35'
4.7 GPM/FT

WELL 120



SWL = 7.2'
2 GPM
18.2' P/L
11' D/D
.18 GPM/FT

GRUNDFOS 25E6
FRANKLIN 1 HP
460V 2.4 A.
SN 33831302